

# S&T Office of Systems Engineering: Overview Briefing

Briefing Presented To:

DoD Human Factors Engineering  
Technical Advisory Group

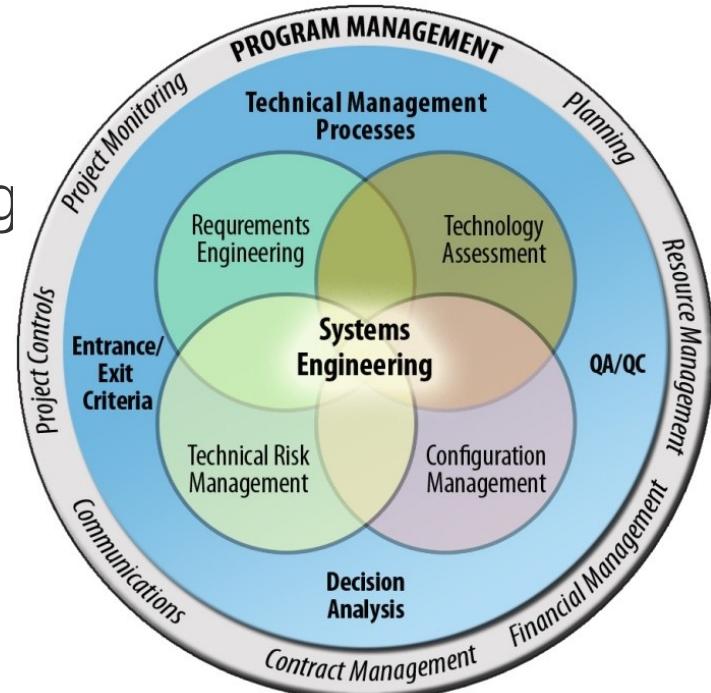
19 May 2014



**Homeland Security**

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Science and Technology



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Acquisition Support and Operations  
Analysis  
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# Agenda

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- DHS History and Overview
- Acquisition and Systems Engineering Lifecycle and Acquisition Lifecycle Frameworks
- S&T Office of Systems Engineering Activities
  - Systems Engineering Center of Excellence
  - New DHS Systems Engineering Life Cycle (SELC) Guidebook
  - DHS SE Workforce Development
  - Support to DHS Programs
- Collaboration
- Summary



# Who became part of DHS?

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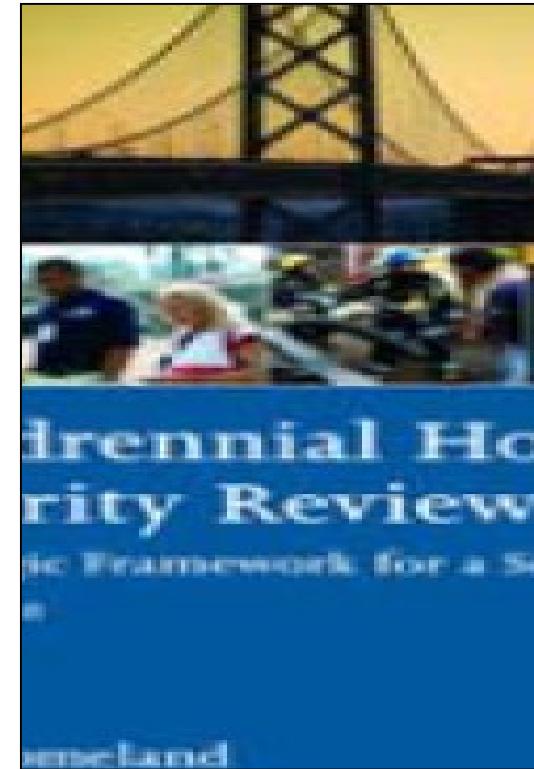
- U.S. Customs Service (Treasury)
- Immigration and Naturalization Service (Justice)
- Federal Protective Service
- Transportation Security Administration (Transportation)
- Federal Law Enforcement Training Center (Treasury)
- Animal and Plant Health Inspection Service (partial, Agriculture)
- Office for Domestic Preparedness (Justice)
- Federal Emergency Management Agency
- Strategic National Stockpile and the National Disaster Medical System (Health and Human Services)
- Nuclear Incident Response Team (Energy)
- Domestic Emergency Support Teams (Justice)
- National Domestic Preparedness Office (FBI)
- U.S. Secret Service (Treasury)
- U.S. Coast Guard (Transportation)



# DHS Core Mission Areas

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- Preventing Terrorism and Enhancing Security
- Securing and Managing our Borders
- Enforcing and Administering our Immigration Laws
- Safeguarding and Securing Cyberspace
- Ensuring Resilience to Disasters





# The DHS Acquisition Portfolio

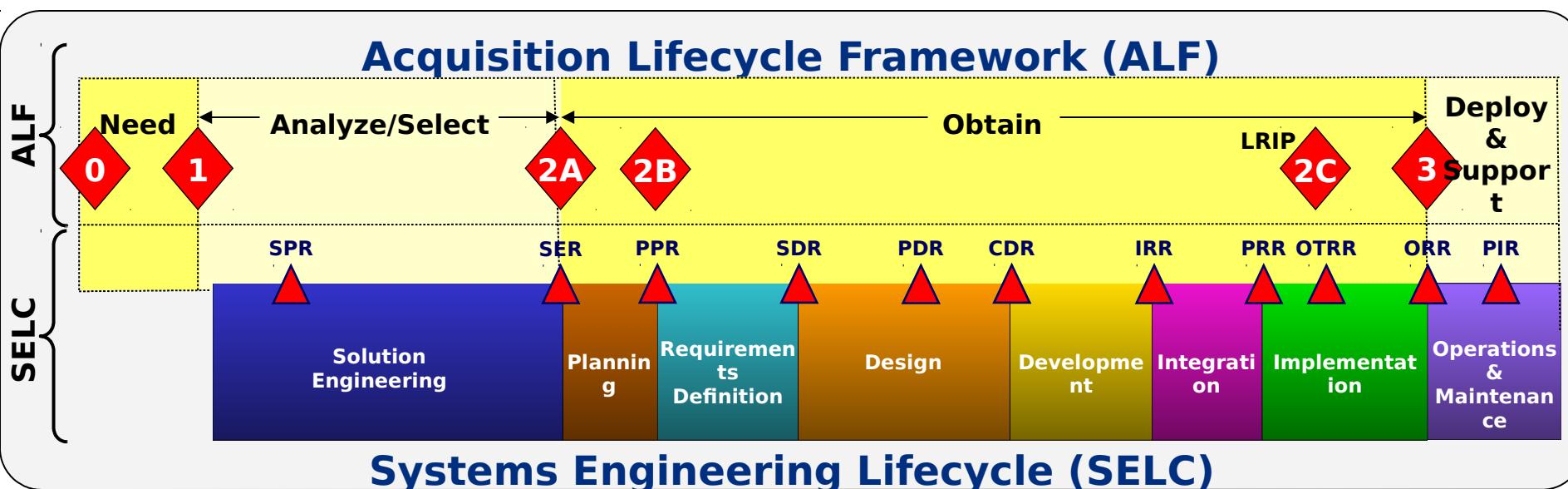
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- 135 Major Programs representing > \$150B investment
  - Approximately 60 Level 1 programs
- Significant Diversity (Products and Approaches)
  - Products include ships, aircraft, IT business systems, facilities, command and control, sensor/detectors
  - Approaches include full development/production, Commercial Off the Shelf (COTS) integration, commodity purchase, and mission/mission support services
- Acquisition is performed by DHS Operating Components and some HQ organizations
- Need for a more robust Planning, Programming, Budgeting, and Execution (PPBE) process



- DHS has an acquisition policy and framework
  - Management Directive (MD) 102-01 (similar to DoD 5000)
  - Initiated in 2009
  - Established the Acquisition Review Board (chaired by the Undersecretary of Management (USM))
- DHS developed a Systems Engineering Life Cycle (SELC)
  - Integrated technical program efforts into the acquisition framework
  - Initially under MD 102-01, Appendix B
  - Introduced Tri-chair (Lead Business Authority (LBA), Lead Technical Authority (LTA), and PM) for SELC technical reviews governance

# DHS Acquisition Lifecycle & SELC Framework Alignment



## ALF Acquisition Decision Events (ADE)

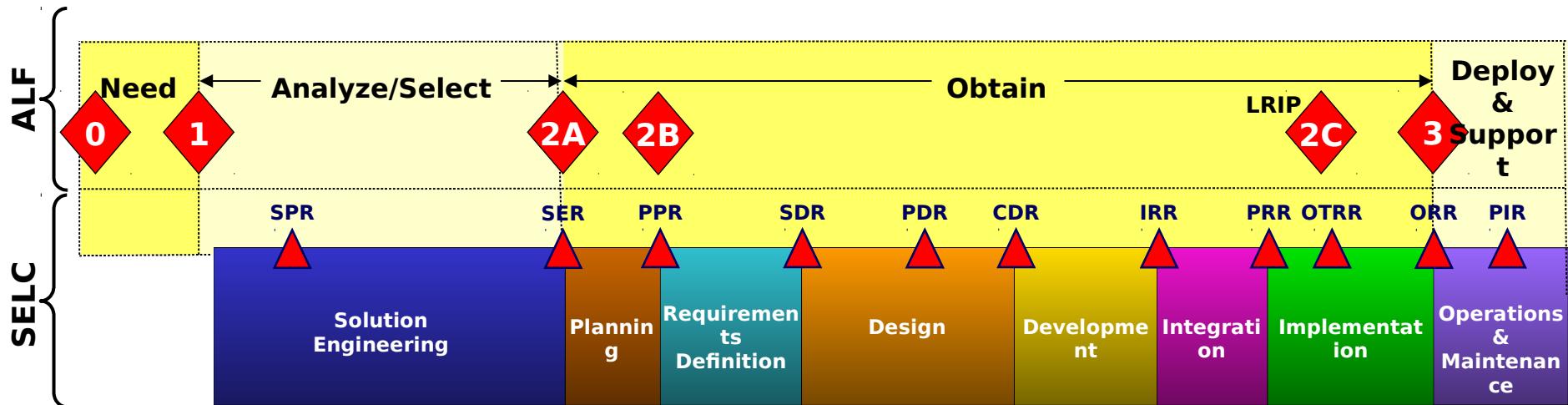
- ADE 0: Collect Needs (Program Pre-Authorization)
- ADE 1: Validate Needs (Program Authorization)
- ADE 2A: Approve Program
- ADE 2B: Approve Supporting Acquisitions
- ADE 2C: Low Rate Initial Production /Incremental Release
- ADE 3: Produce & Deploy Program Products

## Component Level (System Engineering) Reviews

- SPR: Study Plan Review
- SER: Solution Engineering Review
- PPR: Project Planning Review
- SDR: System Definition Review
- PDR: Preliminary Design Review
- CDR: Critical Design Review
- IRR: Implementation Readiness Review
- PRR: Production Readiness Review
- OTRR: Operational Test Readiness Review
- ORR: Operational Readiness Review
- PIR: Post Implementation Review

*The SELC establishes a common System Engineering Life Cycle Framework and ensures that appropriate technical activities are planned and implemented*

# HSI Activities Aligned with the SELC

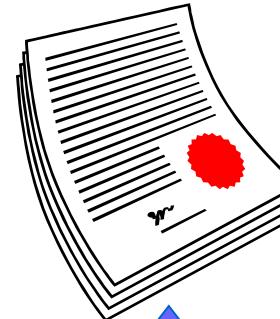


<ul style="list-style-type: none"> <li>Describe the gap or deficiency</li> <li>Identify operational functionality</li> <li>Inputs to P-MNS and P-CONOPs</li> <li>Provide Inputs to user-required mission capabilities</li> <li>Identify HP gaps in needed capability</li> <li>Support Mission Function Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Provide inputs to HP Needs Analysis</li> <li>HSI Inputs to AoA and LCCE           <ul style="list-style-type: none"> <li>- Assess HP aspects of alternatives</li> <li>- Assess HSI risk and affordability of alternatives</li> </ul> </li> <li>HSI Inputs to Technology Assessment/Refinement</li> </ul>	<ul style="list-style-type: none"> <li>Provide HSI Inputs to:           <ul style="list-style-type: none"> <li>- Project Mgmt.</li> <li>- Tailoring</li> <li>- Risk/Training Plans</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>HSI Inputs to the FRD, RTM, TEMP, Dev Test Plans</li> </ul>	<ul style="list-style-type: none"> <li>Conduct studies &amp; analysis (preliminary design)</li> <li>Assess COTS/NDI applicability</li> <li>Develop concepts</li> <li>Conduct studies &amp; analysis: detailed design</li> <li>Detailed design UIs</li> <li>T&amp;E, Risk Management</li> <li>Design Specs</li> </ul>	<ul style="list-style-type: none"> <li>Develop HSI installation criteria</li> <li>HSI inputs to configuration control</li> <li>HSI inputs to Operators/</li> <li>Maintainers Manuals</li> <li>HSI input to Integration Readiness</li> </ul>	<ul style="list-style-type: none"> <li>Provide HSI inputs to User Documentation on Verification and Validation</li> <li>Ensure testing adequately addresses HP requirements and issues</li> <li>Provide HSI inputs to Security Acceptance/ Assistive tech interoperability tests</li> </ul>	<ul style="list-style-type: none"> <li>Provide HSI inputs to the Site Preparation, and introduction to the operational environment</li> <li>Conduct User Training</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate HP during Operation</li> <li>Provide HSI inputs to system enhancements</li> <li>HSI inputs to Assessment of Disaster Recovery</li> <li>Support Operations Analysis</li> <li>Develop HSI Lessons Learned</li> </ul>
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# DHS Systems Engineering Center of Excellence

## SE Best Practices & Lessons Learned



## SE Training & Certification



## Recommendations for Monitoring & Analyzing Program Technical Health and Artifact Quality



## DHS SE COE

## SE Support to DHS Programs



## Implement Enterprise Systems



# Updated SELC Guidebook Philosophy

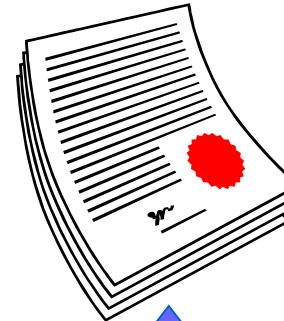
- Developed to help identify appropriate SE activities are planned and implemented
- Incorporates “Best Practices” and guidance from DoD, NASA, INCOSE, DHS Component processes, and industry leaders
- Provides direct understanding of the activities and tasks that a program needs to execute/consider to successfully field a new capability
- Recommends Acquisition Programs develop a Systems Engineering Plan (SEP)
- Provides clear message that programs need to engage in critical thinking, planning, and extensive technical management efforts
- Emphasizes “Tailoring” the SELC at the start of acquisition program based on its specific type and size characteristics

*Updates include HSI throughout the guidebook along with a Supplemental HSI document that addresses implementation and provides program evaluation criteria for activity gate reviews.*



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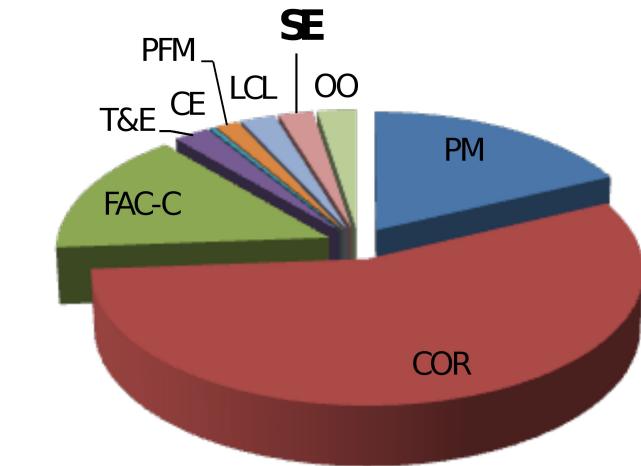


# Acquisition Career Management

**Goal:** Establish a professional certification program to train and develop our current workforce and provide training, and experience requirements for position and specialty.

## Robust Certification Programs

- Cost Estimating
- Life Cycle Logistics
- Test and Evaluation
- Program Management
- Program Financial Manager
- Federal Acquisition Certification, Contracting Officer Representative (FAC-COR)
- Ordering Official
- Warrant Program
- **Systems Engineering** → **Acquisition Certification Policy for Systems Engineering**

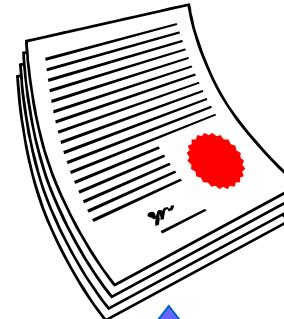


*SE Certification Program includes HSI competencies across three competency levels.*



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## Implement Enterprise Systems



# Support to DHS Programs

Process Element	Project	Customer	Description
Human Performance Requirements Analysis	Human Portable Tripwire (HPT)	Domestic Nuclear Detection Office	HSI inputs to the Operational Requirements Document (ORD)
User-Centered Design	Exit biometrics	Science & Technology	User interface design for biometric systems
User-Centered T&E	BioWatch	Office of Health Affairs	Developed test plans for maintenance and command center
Human Performance Risk Assessment	ICE Enforcement Alien Removal Module	Immigration and Customs Enforcement	Identification of risks associated with EARM user interface usability

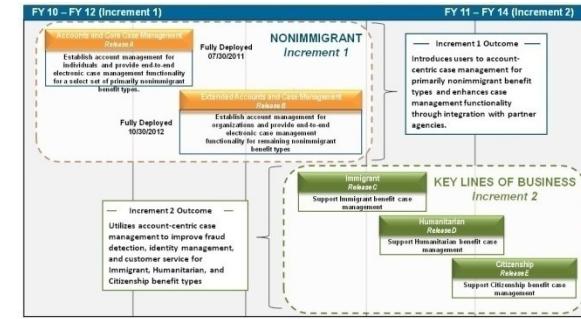


# DHS Systems Engineering FFRDC



# HS SEDI

Homeland Security Systems Engineering and  
Development Institute



## Systems Engineering

- ▶ Architecture development
- ▶ Independent technical assessments
- ▶ Risk and opportunity analysis
- ▶ Software systems engineering
- ▶ Modeling and simulation
- ▶ Test and evaluation
- ▶ Enterprise Systems Engineering
- ▶ Requirements Engineering

## Acquisition SE Support

- ▶ Program/Project Management
- ▶ RFP development & source selection support
- ▶ Cost, schedule, performance, risk trades
- ▶ System concept development
- ▶ Requirements analysis
- ▶ Analysis of Alternatives
- ▶ Review/analysis of design, design alternatives
- ▶ Organizational Change Management

## Integration & Interoperability

- ▶ Proof-of-Concept
- ▶ System of systems integration
- ▶ Experimentation
- ▶ Standards development



Creating mission capability working  
through needs, opportunities and



# Summary

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- DHS has a civilian/law enforcement culture
- Acquisition still somewhat synonymous with procurement
- DHS realizes Systems Engineering needs to be institutionalized
- Developed new SELC guidance based on best practices across industry and federal agencies
  - Emphasizes critical thinking, early comprehensive planning, and program tailoring
  - Recommends Acquisition Programs develop a Systems Engineering Plan adopting “Industry Standard” SE Technical Management Processes
- Stood-up Level I, II, & III SE certification program
- Looking to continue collaboration with other government agencies



# Homeland Security

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## Science and Technology